Hard Tissues of Freshwater Lateolabrax Japonicus

YUAN Lei[1,2], WANG He-jin[1,2*], ZHOU Zhao[1,2], AN Jia-li[1,2]

(1. *School of Earth and Space Sciences, Peking University, Beijing* 100871, *China*;
2. *Key Laboratory of Orogenic Belt and Crustal Evolution, Ministry of Education, Beijing* 100871, *China*)

Abstract: In this paper, crystallographic characteristics of inorganic mineral phase existing in scale, tooth and bone(fin, sphenoid, and backbone) of freshwater lateolabrax japonicus were investigated by means of X-ray micro diffractometry (XRMD), transmission electron microscopy (TEM), environmental scanning microscopy (ESEM) and energy dispersive spectrometry (EDS). Results show that the crystal phase in these hard tissues is sole hydroxylapatite (HAP). The chemical composition characteristics of HAP is lack of Ca and rich in P. Refined lattice parameters of HAP show a wide range in scale (a = 0.941 8- 0.947 7 nm and c = 0.684-0.690 3 nm), in bone (a = 0.942 6-0.945 7 nm and c = 0.687 3-0.688 7 nm) and in tooth (a = 0.946 3 nm and c = 0.688 0 nm). The coherent domain sizes are D_{scale} = 7.204-13.711 nm, D_{bone} = 14.088-17.077 nm and D_{tooth} = 28.219 nm. From tooth to bone to scale it shows a sequence from good to poor in crystallinity. Those textural index R values indicate that all HAPs in hard tissues of lateolabrax japonicus have a preferring orientation along crystallographic c axis. The crystallinity and preferring orientation of HAP are designed by tissue function and controlled by organic matrix. X-ray micro diffractometry can well help to obtain valuable structure information by ways of *in-situ* and non-destruction, and hence it is more suitable than powder diffraction in biomineral studies.

Keywords: hydroxylapatite; X-ray micro diffraction; biomaterial; hard tissue; crystallographic characteristics